IOWA STATE UNIVERSITY
Agricultural and Biosystems Engineering

Matthew Darr

Associate Professor
202 Davidson Hall
515-294-8545
darr@iastate.edu
www.abe.iastate.edu

Education

Ph.D. Food, Agricultural, and Biological Engineering, 2007
The Ohio State University

M.S. Biosystems and Agricultural Engineering, 2004
University of Kentucky

B.S. Food, Agricultural, and Biological Engineering, 2002
The Ohio State University

Honors and Awards

Early Achievement in Teaching Award. Iowa State University College of Agriculture and Life Sciences. (2012)

Early Achievement in Research Award. Iowa State University College of Agriculture and Life Sciences. (2011)

Gale A. Holloway Professional Development Award presented by ASABE. Recognized for outstanding leadership and active involvement in ASABE for early career members. (2009)

Top paper award for Information and Electronic Technologies division of ASABE. (2008)

Price Chair Award for Outstanding Teaching by a Staff Member. Annually awarded to a single staff instructor in the College of Food, Agricultural, and Environmental Sciences at The Ohio State University. (2006)

Recent Publications

Roth, J., **M. J. Darr**. 2011. Data acquisition system for soil-tire interface stress measurement. *Computers and Electronics in Agriculture.* Doi:10.1016/j.compag.2011.07.003.

Medic, D., **M. J. Darr**, A. Shah, B. Potter, and J. Zimmerman. 2011. Effects of Torrefaction Process Parameters on Biomass Feedstock Upgrading. *Fuel.* Doi:10.1016/j.fuel.2011.07.019.

Shah, A., **M. J. Darr**, D. Medic, R. Anex, D. Maski, and S. Khanal. 2011. Techno-economic Analysis of a Production-scale Torrefaction System for Cellulosic Biomass Upgrading. *Biofuels, Bioproducts & Biorefining.* Doi:10.1002/bbb.336.

Thoreson, C., **M. J. Darr**. 2011. Durability Analysis of Large Corn Stover Briquettes. *Applied Engineering in Agriculture.* In Press.

Shah, A., **M. J. Darr**, K. Webster, and C. Hoffman. 2011. Outdoor Storage Characteristics of Single Pass Large Square Corn Stover Bales in Iowa. *Energies.* Doi:10.3390/en4101687

Teaching

Dr. Darr teaches courses related to machinery systems and instrumentation within both the Agricultural Engineering and the Technology Systems Management program. In TSM 333, Precision Farming Systems, his students experience hands on training in precision agriculture with a focus on machinery related issues. Class activities are conducted within the state-of-the-art Ag Leader Technology Precision Agriculture Lab. Dr. Darr is also the primary instructor for AE 410, Electronic Systems Integration for Agricultural Machinery and Production Systems. This course focuses on the use of embedded electronic systems for advanced production system automation and the use of distributed electronic communication in machinery systems. Laboratory activities are conducted in the Fluid Power Lab in order to allow students to design and test electro-hydraulic control systems. Dr. Darr also mentors students outside of the classroom by serving as the co-advisor for both the Quarter Scale Tractor Design Team and the Agricultural Systems Technology Club.

Research

Dr. Darr's research program focuses on the use of embedded systems and advanced instrumentation to enhance the efficiency, productivity, and control capacity of agricultural systems including those for food, fiber, and energy production. Currently this work is focused in two application areas: Advanced sensing and control systems for optimized machinery management resolution, and Determination of the optimal storage environment for cellulosic biomass feedstock.

Advanced Sensing and Control Systems for Optimized Machinery Management Resolution

Current trends in agricultural equipment require field inputs to be precisely controlled based on the spatial location within a field. New sensor and control technologies are being developed to increase the management resolution of application machinery in order to further promote the agronomic gains of precision placement. Additional work is focused on overcoming the limitations of current electronic communication standards and integrating wireless data transfer into machinery electronic systems.

Determination of the Optimal Storage Environment for Cellulosic Biomass Feedstock

The development of a viable pathway for cellulosic based biofuel production is a critical step in achieving energy independence. Dr. Darr conducts research in monitoring and optimizing the storage and densification of biomass. His work focuses on methods to maintain quality throughout the feedstock supply system and to maximize feedstock value through implementation of on-farm preprocessing steps. Specific projects deal with determination of biomass material properties, analysis of on-farm torrefaction methods, design of in-field densification machinery, and logistical optimization of feedstock transportation.